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ABSTRACT

The acute care pediatric/adolescent unit at Saint Joseph Hospital in Chicago, Illinois offers patients computer services consisting of recreation, general education, newspaper, and patient education components. To gather information concerning patients' experience with computers and to assess the effectiveness of computer services, data were collected by surveys and observation. Survey results indicated, among other things, that a computer does motivate older patients who would have refused other activities available to them. Observations indicated that computer services meet many basic needs for the patient: hastening recovery, providing a sense of control, discouraging self-imposed isolation, and promoting psychosocial adjustment to the hospital. It is concluded that the computer provides very positive therapeutic and educational experiences for children and adolescents from 6 to 20 years of age. (RH)

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Meeting the Educational and Therapeutic Needs of Short Term Hospitalized Children with the Aid of the Computer

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Abstract

Hospitalized children have special social, psychological, and educational needs. The computer's capabilities make it a flexible tool that can help meet individual needs of a patient population with even a diverse age range. This article addresses patients' needs and shows how the development of a comprehensive computer program can help meet these needs.

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BACKGROUND

Saint Joseph Hospital has an acute care 16 bed Pediatric/Adolescent unit for ages 0-20. The hospital stay usually ranges from 2 to 7 days. The child life program is staffed by 1 child life specialist with an accessible activity room to the unit and no separate adolescent room. The program has been designed to make maximum flexible use of equipment, materials, time and space, and to provide appropriate options for choice to all patients, whether they are confined to bed, wheelchair or ad lib.

The Computer Program

The child life program uses a Texas Instruments 99/4a home computer, a TI color monitor, a TI expansion system, a TI tape recorder and a Banana Gorilla printer from Leading Edge. The support software programs include nine recreational and eleven educational cartridges, two patient education programs, along with LOGO, Basic and word- processing programs. Many of these educational and recreational programs have options available to individualize the program to the level and interest of the user. It is not unusual for a program to be appropriate for grades 1-8.

The goal of the computer program is to develop a wide range of computer options for patients ages 6-20. (See computer checklist) Patients under 6 years of age do not partipate in computer activities due to the amount of instruction and supervision required. The computer program is made up of (1.) a recreational program (2.) an educational program (3.) production of a patient newspaper using word processing (4.) and patient education programs. The patient's computer-generated newspaper provides a complete listing of computer options, and other activities available as well as the rules for computer use. The paper allows patients to become aware of resources available before they encounter the child life specialist.

One special goal is to provide patients with maximum access to the computer despite their activity status. The computer therefore is stored on its own portable, expandable locking storage cart which can easily roll into a patient room and fit up to the bedside. While at bedside the cart expands to hold the computer during use.

Supervision and Guidelines

Supervision of computer use varies, depending on the situation. Computer instruction includes computer awareness and specific instruction determined by the program chosen by the patient. Mature patients or patients with a supervising adult need not be so closely watched. This is necessary in a 1 person department where many activities are offered to a wide range of ages.

Saint Joseph Hospital has a Texas Instruments 99/4A home computer for the pediatric/adolescent patients from 6 to 20. There are many different things that a computer can do. Please read the checklist below and if you are interested in using the computer please check and/or circle what you are interested in.

COMPUTER CHECKLIST
(if more than one please number in order of preference)

1. Recreational games_____(circle below)
   A. Parsec(battle alien ships)
   B. A-Maze-ing(a cat and mouse chase within a maze)
   C. The Attack(play commander of ships in a region of space infested by spores and aliens which must be destroyed)
   D. Zerozap(computerized pinball)
   E. Hangman(figure out mystery word)
   F. Connect Four(get 4 markers in a row to win. down, across diagonally
   G. Yahtzee(dice game, make points by rolling certain number combinations)
   H. Munchman(move quickly to outmaneuver hoonos while connecting maze passages with a chain)
   I. Microsurgeon

2. Educational Games(a program for grades 1-8)
   (Circle below)

   A. Early Learning Fun(ages 3-6, math)
   B. Beginning Grammer(grades 2-5)
   C. Number Magic(ages 6 and up, math)
   D. Video Graphs(all ages, designs)
   E. Reading Fun(grade 2)
   F. Reading On(grade 3)
   G. Computer Math GamesVI(grades 1-9)
   H. Alien Addition(no age indicated, math)
   I. Alligator Mix(no age indicated, math)
   J. Dragon Mix(no age indicated)
   K. Music Maker(no age indicated, making own music)

3. Computer Programming_____

   (Learn how to do some simple programming. Recommended for patients who are interested in pursuing computers as a career).

   Basic_____
   LOGO_____

4. Word Processing_____

Word Processing is when you type on the computer keyboard like a typewriter but you can make corrections by pushing certain keys. Then what you wrote can be printed out.

How would you like to contribute to our patient newspaper for the Pediatric/Adolescent unit? Maybe describe a medical test you had to take so others will know what to expect....

(Circle below)
A. Describe a test you have taken_____
B. Write a poem or a story about anything you wish
C. Describe your hospital stay, or where you would rather be, things you like to do, about your family, or anything else....
D. Ask questions for the Dear Dr. column
E. Messages to other patients, your nurse, your friends or family
F. Write an editorial....In my opinion....
G. Any other ideas are welcomed.

(Your descriptions, poems, stories, etc. will becomae part of the Former Patients section after you leave the hospital so others will be able to share what you have written.)

5. Patient Education_____
(Learning about the hospital on the computer)

A. Operation Quiz(after reading the patient education booklet)
B. We are Going to Learn More about the Hospital

NAME_____
Room Number_____

Give this sheet to Sandy, the Child Life Specialist who is in charge of the Activity room and the computer.

PATIENT NEEDS / COMPUTER USES	RECREATIONAL GAMES	EDUCATIONAL PROGRAMS	NEWSPAPER (WORD PROCESSING)	CAPE COMPUTER ASSISTED PATIENT EDUCATION
FAMILIARITY WITHIN ENVIRONMENT PROMOTES NORMALIZATION	X	X	X	
AIDES IN UNDERSTANDING, COPING AND MASTERY OF SITUATION			X	X
LESSENS THE WORRY OF MISSING SCHOOL	X	X	X	
OFFERS A WIDE RANGE OF CHOICES	X	X	X	X
PROVIDES NON-THREATENING, DIVERSIONARY ACTIVITIES	X	X	X	X
PROMOTES SELF EXPRESSION		X	X	X
PROMOTES LEARNING, GROWTH AND DEVELOPMENT	X	X	X	X
ENCOURAGES SOCIALIZATION-INTERACTION WITH OTHER PATIENTS	X	X	X	X
ADAPTIVE TO INDIVIDUAL NEEDS OF PATIENT	X	X	X	X
ENCOURAGES COMMUNICATION-SHARING OR NETWORKING BETWEEN FAMILY, STAFF AND OTHER PATIENTS	X	X	X	X

Figure 1. Patient Needs Versus Computer Uses

COMPUTER PROJECT _____ DATE _____

				ROOM NUMBER
				NAME Diagnosis
				AGE race/sex
				ABLE TO PLAY (Y or N)
				INTEREST IN OTHER ACTIVITI FIRST(Y Or N) describe
				TIME INVOLVED
				NUMBER OF PROGRAMS USED ie.1-ed.,1-re
				LIST PROGRAMS USED
				Location of USE- AR-G/I or PTR-B/C/W-C
				COMMENTS ON INVOLVEMENT grade level no. siblings younger/older computer? home or school play video games before? feelings abou being in Peds

Appendix 1. Data collection form used for Survey 1

Younger patients require constant supervison and instruction.

Guidelines for computer use is dictated by demand, although educational uses have priority over recreational. For safety reasons, patients with IV's are not allowed to have direct contact with the computer, although there are games where they can participate by having another patient type in for them(Hangman). Patients with eye conditions are discouraged from using the computer due to potential eye strain.

Research Methods

A general list of patient needs was devised according to accepted guidelines for psychosocial needs (Thompson & Stanford, ACCH 1980). Figure 1. lists these needs and correlates them with the four levels of computer use that meets these needs. Data was collected by various methods, including case studies. Three surveys were made to determine if goals could be met.

The first survey was done from June 20 to September 2, 1983(summer vacation). Patients were questioned in order to determine computer background(home and school), whether they were interested in other activities before becoming aware of the computer, etc. (See Appendix 1.) Data was recorded on the time spent, programs used, group or individual use, actual activities involved in during hospital stay, sex, age and race.(Ciminero 1983)

A second survey was done from September 3 until May 1, 1984 to determine if computer background had changed and also recorded some additional computer usage information.(Ciminero 1984)

Case studies include observations and comments, particularly where the computer has made a difference.

A third survey was done with 30 public and 30 private schools to determine the trends in computer usage within school systems, as well as reference use for program development and in determining individual needs.(Ciminero 1984)(See Table 2)

PROBLEMS/COMPUTER SOLUTIONS

Psychological/Social Needs

A common goal in child life programs is to help ease the transition into the hospital and to make life as normal as possible. It is important to offer activities that are both familiar and age appropriate. The first two surveys were done over a period of a year and reflect an increase in video machines and computers in our patient's homes. During the first survey, only 19 of the 58 patients surveyed said that they had computers or video games at home, of whom only two stated that they had never had experience with either. The second survey from Sept.

1983 to May 1984 revealed 34 of 58 patients surveyed had either video games and computers with another 10 soon to purchase computers.

Because the computer appeals to a wide age range it can be an effective tool in psycho/social adjustment to the hospital. It helps to decrease the negative feelings older adolescent patients sometimes have about being on a Pediatric unit. One example is a 16 year old male patient admitted for an deviated nasal septum operation. His mother stated that before admission he wasn't too happy about going to Pediatrics. But when the computer was introduced his opinion changed drastically. Not only did he state that he preferred to be in pediatrics, but it was almost impossible to drag him away from his experimentation with basic graphics and word processing. It was particularly helpful in keeping him involved until his operation. The activity brought him out of him room and he even socialized with a 13 yr. old female in a few computer games. Survey 1(see Table 1) also indicated that the computer made a difference in the activity level of patients 16-20 who had reservations about being on a pediatric/adolescent unit. The patients with reservations spent more time on the computer and participated more in other activities available than the patients who had not expressed reservations.

One very desirable aspect of the computer is that it offers activities that encourage choice, including the choice for either individual or group interaction with the computer. For example, there were five patients (from 11-14 years old), both male and female, black, white and hispanic who became so involved in running through every educational and patient education program as a group that the child life specialist stayed 3 hours overtime. The interaction of the patients with each other and the computer was so satisfying, particularly since all 5 had been on bedrest, several with IV's. The computer became the "hangout"and center of activities.

The computer has brought together members of different age, racial and sexual groupings. A 20 year old female with a 6 year old boy. A 9 year old boy with a 16 year old boy. A 13 year old male and a 20 year old female. Three females ages 20, 19 and 12 playing with an 8 year old male. This is a very beneficial aspect on a small pediatric/adolescent unit where the age range is so wide. When space is limited, it is desirable to find tools that will help to bridge the age gap and reach more patients at one time. The computer is such a tool.

The computer discourages self-imposed isolation. One 14 year old patient with a lower abdominal mass isolated herself, had minimal communication with anyone and even insisted that the curtains be kept drawn. The computer was the only activity which was of any interest to her and she came out of her room to spend 1 and a half hours on the computer.

Number of Patients	
10	7
A	B

A group didn't mind being in the Pediatric/ Adolescent Unit

B group DID mind being in the Pediatric/ Adolescent Unit

Length of Hospital Stay	
average 4.6 each	average 5 each
46 total days	35 total days
A	B

Computer Encounters	
average 1.2 each	average 2.2 each
12 total	16 total
A	B

Time spent Using the Computer	
average 52 min. each	average 2hrs.15 min. each
8 hours 40 min. total	20 hours 15 min. total
A	B

Actual Activities				
Computer only	8	80%	3	43%
Both computer and 1 other act.	1	10%	2	29%
Both computer & many other act.	0		1	14%
Other activities only	0		1	14%
Neither computer or other activities	1	10%		
	A didn't mind being in P/A Unit		B did mind being in P/A Unit	

Table 1. (Survey 1) The Effects of the Computer on Adolescents from 16 to 20 years of age

The computer offers non-threatening, diversionary activities which provide an opportunity for gaining back some of the control lost by hospitalization. Power over the machine! The patient can release some of their aggressions by playing fast-moving, action-filled games. Terry was a 7 year old confined to his hospital room for 10 days. He had a lot of energy to dispel, despite pneumonia. He was definitely on the road to recovery, yet the doctor wanted to make sure his recovery was complete since his illness had been recurrent. Everyday the first question was "Where's the computer?" He " physically" jumped into playing the more competitive games, declaring boredom with the less active games. He was very satisfied to be able to continually gain more control and improve his game. Greenfield believes that the amount of control the child has depends on the computer use and therefore to have the most positive experience the computer use must be chosen appropriately for each child. Different computer programs require different skills, such as knowing where the keys are on the keyboard, good hand-eye coordination, etc.

Not all patients would benefit from the fast- moving, skill-oriented games. Patients do not always need these type of games, particularly younger children with less hand-eye coordination and who may encounter only additional frustrations. The child's age, personality, and the reaction/adjustment to the hospital needs to be assessed in order to encourage appropriate options. When in doubt, begin with easier games of luck or at a beginning level and work towards more difficult levels of play.

The computer can hasten recovery. A ten year old boy before surgery asked if he could continue to use the computer after surgery. He was not yet in the recovery room when he asked the student nurse if he could hurry up and go upstairs to play the computer. He came up 1 hr and a half later and was soon on the computer at the bedside acting as if his surgery was a rude interruption from his playing the computer.

The computer has been a very important activity option for patients. An eight year old boy was scheduled to work with the computer in the afternoon but in the meantime was discharged. He told his mother and the nurse that he couldn't go home until he used the computer. The nurse went looking for the " computer lady" so he could eventually be discharged and go home.

The educational opportunities provide a substitute for school missed that can ease the anxious patient who is worried about getting behind in schoolwork.(See Educational section)
Physical handicaps such as traction or having a body cast can be frustrating because movement and activities are restricted. For mamimum flexibility a computer needs to be able to come to the bedside and fit up against the bed. Many programs have the option to play either on the keyboard or with the joysticks, making the computer more adaptable for these kinds of physical problems. The computer thus encourages the mind to remain active even when body must remain passive. The computer can also be an

exciting alternative option for physical therapy involving developing use of the hand.

The computer's word processing program is a perfect place for patients to express their anxieties. The opportunity for self-expression provides an outlet for acknowledging fears, experiences, etc. Patients are given another option of including their writings in the patient newspaper and also in a patient education booklet to share with others. Patients have responded enthusiastically to the opportunity to help someone else through the same procedures they went through. They feel helpful and important.

1st Survey

The first survey from June to Sept. 1983 reveals the difference the computer makes on activity levels of patients from 6-20 which relected original expectations. See Table 2. In this study, all patients from 6-20 were given a detailed activity list, containing 53 art activities, over 50 games, an assortment of magazines and books available to them, minus the computer option. After recording their interest in any of the activities, they were given the option of using the computer, which was also recorded. There were 58 patients from 6-20 admitted during the time period for the survey. 40 were hospitalized for surgery and 18 for medical reasons. The majority of patients stayed for 2 or 3 days with a mean stay of 3 1/2 days. There were 27 females, 31 males, 11 Hispanics, 13 Blacks, 33 Whites and 1 Indian, with 20 patients from 6-10, 16 from 11-15, and 22 from 16-20 years of age.

Results

Patients 6-10 expressed interests in both using the computer and trying out other activities available. Patients 11-15 were more divided in their interests with half interested in only the computer and the other half interested in both options. The computer made the most difference with patients 16-20. Initially there were 54% only interested in the computer and 36% interested in both options, and in the end 59% played the computer only, 18% both options. The computer is not for everyone though, five patients turned down the computer for a variety of reasons. three were surgicals who had arrived late in the afternoon and either had company or wanted to watch their favorite TV program. The other two would have played the computer if Pacman had been available. Overall, the survey indicates that a computer does activate older patients who would have refused other activities available to them.

The Educational Computer

The computer in the hospital can provide unique learning environment where the patient has the option to try any of the educational programs or just become more aware of what the computer can do. The computer is a versatile tool because it can

Table 2. (Survey 1) Differences in Expressed Interest Versus Actual Activity(by age)

Ages	Expressed Interests									
	A		B		C		D		E	
	N	%	N	%	N	%	N	%	N	%
6-10 (20)	-	-	19	95%	-	-	1	5%	-	-
11-15 (16)	8	50%	7	44%	-	-	1	6%	-	-
16-20 (22)	12	54%	8	36%	-	-	2	10%	-	-
Total (58)	20	34%	34	59%	-	-	4	7%	-	-

A= Computer only, refused other activities available
B= Interest in both Computer and other activities
C= Interest in other activities only
D= Interest in neither, according to choice(visitors, TV)
E= Neither due to time, circumstance

Ages	Actual Activities									
	A		B		C		D		E	
	N	%	N	%	N	%	N	%	N	%
6-10 (20)	-	-	19	95%	-	-	1	5%	-	-
11-15 (16)	8	50%	7	43%	-	-	1	6%	-	-
16-20 (22)	13	59%	4	18%	1*	4%	3 (2*)	14%	1	4%
Total (58)	21	36%	30	52%	1	2%	5	8%	1	2%

*didn't play because computer programs did not include Pacman

be used in so many ways which can encourage individualization. In our program the computer provides the child with a choice to continue learning at their own level. The fact that they aren't required to may even make the educational computer more interesting.

There are so many educational experiences available on a computer. One patient's comment was, "I want to see how the TI is different from the Apple computers at school." Computer awareness is the best approach for a new computer user, encouraging the patient to discover just what it can do. Learning computer languages such as Basic or LOGO, using the computer assisted instruction or creative writing via word processing not only provides educational opportunities for the patients, but creates a more positive, productive hospital environment in which the patient can recover. Whether it is used at home in school or in the hospital, a computer should be used as creatively as possible by the user. Papert states "...a more child centered, free-flowing, intuitive approach, that style of using the computer is what we need to learn about now, because that's what the future needs." Hospitalization does not mean that the mind must become inactive, but the computer can provide a rewarding challenge and even a creative experience when many options are available and the computer program is flexible. Kohl makes the point that "We must use them for what they are: complicated storage, retrieval, and choice machines, rather than linear textbooks or flash cards."

It is not economically feasible to have a tutor or hospital teacher available for patients having short term hospitalizations. Often the child is anxious about missing school and getting behind in schoolwork. Although a computer may not offer exactly what they are studying, the child has a choice to work on educational programming. A eleven year old patient stated, "It's helping us to learn because we can't go to school." A computer education program can be particularly helpful to patients with special learning problems or with patients who have recurrent hospitalizations. One six year old with learning disabilities showed noticable improvement in following directions and in understanding cause and effect from using the educational and recreational programs.

Our hospital computer users can generally be categorized in the following ways: (a.)The regular school or home computer user (b.) The future school computer user who hasn't qualified for a computer class yet (c.) The potential computer user who has the desire but not the opportunity (d.)The career-minded computer user.

Within one two week period, there were 5 patients from 15-20 who stated that they were planning to pursue a career in computers. One knew 4 computer languages already, 1 taught computer classes at his private school, 1 was majoring in computer science at a college, and one wanted to take computer classes but did not

qualify due to rigid math grade requirements. All were interested in trying out the Texas Instruments computer to compare with computers they have used before. Some wanted just to experiment with basic or programming.

Often the computer use is influenced by past computer use and what they were familiar with. The more experienced user generally has a greater desire to try out more computer options. With our hospital computer, patients often have more concentrated computer discovery time available during their stay than there would be available to them at school. Other patients have just not had the opportunity for any type of computer awareness.

Survey 3(Ciminero 1984)(See Table 3) indicates that not only do private schools surveyed have more computer programs in existence and in the planning stages than public schools, but they also have a greater number of computers available to more age levels , and generally present more computer options. Each of the computer options available are being presented at each grade level, but not in all schools. In general, CAI(computer assisted instruction) was the most widely used computer curriculum for grades 1-4, followed by both basic and LOGO. Basic was the most widely offered computer curriculum for grades 5-8, followed by CAI. Word processing was was growing on all levels, particularly in private schools as necessary equipment and personnel was obtained.

Researchers predict that computers are going to continue to be on the increase in schools. Hardware sales are expected to continue growing until 1987 when almost every school will have a computer lab of at least 20 computers.(TALMIS) But there are already indications(Ciminero 1984) that there is an imbalance in school computer opportunities. Public school children have not had the same basic computer orientation when compared to their private school counterparts. A computer awareness orientation in the hospital can help to bridge the gap between those who have computers at school and those who don't.

Video Games as another Educational Experience

Children usually encounter video games long before computers and video games appear to be the link between TV and computers. For many years there have been many negative connotations associated with television. Some critics view television a addictive and passive, projecting negative stereotyping and violent themes and offering minimal learning experiences. Studies done with hospitalized children(which are comparable to studies done with non-hospitalized children) indicate that television is viewed as a positive diversionary activity for children when there is adult guidance in selection of programs viewed and limitations made in the amount of viewing time permitted.(McCrain & Bies) Video games no doubt have similiar negative potential, and guidance is necessary in their use. Video games have been shown to aide specific intellectual development. Greenfield argues that

	Public		Private	
	N	%	N	%
Computer programs available	14	46%	24	80%
Programs in Planning Stages	5	16%	3	10%
No Computer Program at all	11	36%	3	10%
Totals	30		30	
	Public		Private	
Number of computers/number of Schools at present time	72/14		194/24	
future- computers/schools	27/3		21/1	
Totals	99/17		215/25	
Average number of Computers to each school	5.8		8.6	

Table 3. (Survey 3) March 1984 Schools Survey

besides requiring active participation, inductive thinking is necessary to figure out the actions within a game in order to win. Parallel processing of information or doing different actions at the same time as well, as well as exercising spatial skills make video games educational. Supervision and guidance in computer option selection can have positive results.

It is a reasonable assumption to make that video games are often experienced before computers. The reasons for this in part have to do with the difference in cost between home computers and vidoe games, the availability of arcade games, and the fact that computers appear complex and less easy to understand. Video games take considerably less time to learn how to use than computers, but they are much more limiting. As indicated earlier in survey 1 and 2, both computers and video games are on the increase in the homes. But there is also indication that the public is not fully aware of what a computer can do for them or how to use one if they purchased one. Although there is widespread motivation to buy computers, many computers are predicted to end up in the junkpile due to deprivation of computer awareness and know-how.(Chicago Tribune) Thus the hospital computer can be an opportunity for both the patient and family to learn what the computer can do for them in order to go beyond the video game.

Gaming is a great tool for interactive learning and social interaction because participation is required. "Video games are the first medium to combine visual dynamism with an active participatory role for the child."(Greenfield) Video games can orient the child for later use of computers and eventually for computer self-expression. The computer that is being just used for playing video games is a waste of vast capabilities. Therefore a hospital computer should be developed to promote patient education and self-expression.

Developing patient education materials

If a hospital computer program is to be developed, the hospitalized patient needs to become an active participant. There needs to be an abundance of appropriate educational materials available that will help them to better understand of what is or will be happening to them. As previously mentioned, patients can effectively help to teach other patients about procedures they have had via the computer and word processing. There are many benefits. The patient who is describing the procedures has the opportunity to recall and express in their own words what they encountered and felt, which can in itself help them to put events in perspective. Other patients facing the same procedures are provided with additional preparation. Also from these descriptions staff can also get feedback on their patients. One description of ultrasound was given by a 11 year old, "They put some gel on your stomach. It's pretty ticklish. Then they rub that microphone on your stomach. You can see your gall bladder, your heart and all of your insides. The screen is kind of dark.

It made me laugh."

The future of computerized patient education can be exciting. In developing patient education programs in Basic, there also must be an awareness of what makes computer games so popular, in order to keep the patient's interest. A study was done to determine children's game preferences and the top 7 features were goal, computer keeps a score, audio effects, randomness involved in a game, speed of answers, visual effects, competition and variable difficulty level(Malone 1984). Educational games that provide information relating to each child's experience and level of understanding can be a great potential to promote patient and health education.

Conclusion

The computer provides very positive therapeutic and educational experiences for hospitalized children and adolescents from 6 to 20 years of age. Varied psychosocial needs can be met as a result of the vast capabilities that a computer has to offer. It is reasonable to hope that computerized patient education programs will be further developed in the future in order to adapt the computer even more to the hospital setting. A hospital computer that promotes self-expression and learning, besides providing entertainment, can only improve the psychosocial hospital life of the patient.

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